

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
SAN FRANCISCO DIVISION

IN RE SEAGATE TECHNOLOGY LLC
LITIGATION

No. 3:16-cv-00523-JCS

DECLARATION OF STEFAN
BOEDEKER IN FURTHER SUPPORT
OF PLAINTIFFS' MOTION FOR
CLASS CERTIFICATION

DATE: March 30, 2018
TIME: 9:30 a.m.
DEPT: Hon. Joseph C. Spero
Courtroom G, 15th Floor

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I. INTRODUCTION

1. I, Stefan Boedeker, a Managing Director at the Berkeley Research Group, LLC (“BRG”), was retained by counsel for Plaintiffs in *In Re Seagate Technology, LLC, Case No. 3:16-cv-00523-JCS*, to develop an economic loss model to quantify the damages, if any, suffered by the proposed class that are attributable to the purchase of certain Seagate Drives that was not as presented and advertised to the consumers. Specifically, I have been retained to develop and perform an empirical study to assess the new market equilibrium price that customers, who purchased certain Seagate Drives would have paid if they had known about the defects at the time of purchase.

2. Previously, I submitted the Declaration of Stefan Boedeker in Support of Plaintiffs’ Motion for Class Certification on Nov. 8, 2017 (“Boedeker Declaration”) where I had developed a theoretical model that shows how the demand for a product changes when attributes and levels of attributes for that product change. To quantify the change in demand when the attributes of the product change (*e.g.*, when claims about the product are false and misleading), I designed a choice based conjoint study.

3. I applied the well-established scientific methodology of Mixed Logit modeling and Hierarchical Bayesian Estimation to analyze the data from the efficiently designed choice based Conjoint Analysis. The results from the conjoint analysis can be relied upon to draw inferences about the value of claims to customers at the point of purchase and how such value will change when the claims are revealed to be false at the point of purchase.

4. The conjoint analysis estimated what respondents would have paid for a product with none of the attributes falsely claimed, which can be utilized to compute class-wide economic losses when the Court decides that the claims at issue were all found to be false and misleading.

5. Lastly, I concluded that the method proposed and described in the Boedeker Declaration can be used to expand the results of the conjoint study to a complete model to calculate class-wide damages in the merits phase of this case by multiplying the economic loss per unit as established in my study with the number of units purchased by class members during the class period.

6. In addition, the model presented in the Boedeker Declaration to compute class-wide economic losses can be expanded in the merits phase of this case to incorporate additional aspects if the Court deems this necessary.

7. I was deposed by the defendant in this case on December 12, 2017.

8. I submit this Rebuttal Declaration in response to the Declaration by Itamar Simonsen, Ph.D., dated January 5, 2018 (“Simonson Declaration”), submitted by Seagate, LLC in opposition to Plaintiffs’ motion for class certification in this matter.

II. SUMMARY OF REBUTTAL OPINIONS

9. Based on a thorough review and analysis of the Simonson Declaration and its supporting work papers, I have formed the following opinions:

Opinion 1: The Simonson Survey is irrelevant to the determination of consumer preferences, consumer demand, and economic losses.

Opinion 2: The survey presented in the Simonson Declaration is flawed and a statistical analysis of the data derived from the survey supports the findings from the Boedeker Study.

Opinion 3: The Simonson Survey does not survey the relevant population of purchasers of Seagate drives.

Opinion 4: The Simonson Survey mirrors the Boedeker Survey in large parts but fails to generate a sufficient number of data points to draw any reliable conclusions.

Opinion 5: Due to a fundamental lack of understanding Choice Based Conjoint analysis, the Simonson Declaration misrepresents the empirical study in the Boedeker Declaration.

Opinion 6: The Simonson Declaration’s criticism of focalism bias is based on a gross misrepresentation of the Boedeker Study.

Opinion 7: The Simonson Declaration fails to apply statistical principles of significance and confidence intervals to its own survey results.

Opinion 8: The Simonson Declaration is based on a gross misrepresentation of fundamental economic principles of supply, demand, price setting, and consumer choice.

III. SUMMARY OF CONCLUSIONS

10. The conclusions about the economic loss model presented in the Boedeker Declaration that have been brought forward in the Simonson Declaration are based on either gross misrepresentations and gross misunderstandings of the economic loss model in the Boedeker Declaration, the failure to apply statistics, or the incorrect application of statistical principles to the data from the survey discussed in the Simonson Declaration.

11. In fact, the Simonson Declaration neither attempts to address the question of economic loss to the members of the putative class nor does it rebut the economic theory and the econometric and statistical methodology presented in the Boedeker Declaration.

12. Based on the rebuttal opinions summarized in the previous section, I conclude as follows:

Conclusion 1: The concept of “Likelihood of Buying” in the Simonson Study is based on a misnomer and the concept itself is insufficient to provide any insights into economic losses to the members of the putative class.

Conclusion 2: The survey results in the Simonson Declaration do not support the conclusion that consumers are equally likely to buy a Seagate HD with an AFR <8% and one with an AFR<1%.

Conclusion 3: None of the analyses performed, opinions formulated, and conclusions drawn in the Simonson Declaration have an impact on my opinions and conclusions regarding economic losses suffered by the class as expressed in the Boedeker Declaration.

IV. DETAILED SUPPORT FOR OPINIONS 1 THROUGH 8

A. Opinion 1 – The Simonson Survey is irrelevant to the determination of consumer preferences, consumer demand, and economic losses.

13. The survey presented in the Simonson Declaration does not address the same issues as the economic loss model developed and applied in the Boedeker Declaration. The choice based conjoint study presented in the Boedeker Declaration is a tool designed to measure if there is a shift in the demand for a product when additional information is made available to consumers at the point of purchase. Advanced econometric choice models and statistical estimation techniques like the

1 Mixed Logit model and the Hierarchical Bayesian Estimation methodology are then applied to
2 quantify the change in the product demand. In this context, consumers' price sensitivity when
3 product attributes change is measured explicitly and can be used to model "what-if-scenarios". The
4 survey presented in the Simonson Declaration does not address the impact of product prices and
5 changing product attributes at all. Instead it attempts to measure consumers' intention of buying or
6 predicting consumer behavior using a crude categorical 5-point scale for one fixed price point.

7 14. Even though, stated intentions to buy a new product or service are often the best
8 available predictors of behavior and the fact that this approach has been used by businesses and
9 consumer behavior research regularly to predict buying decisions by consumers, this approach
10 cannot answer the question if the demand curve for a product shifts if new information about the
11 product is disclosed at the point of purchase and then quantify the magnitude of the shift if it has
12 occurred.

13 15. The managerial practice of relying on the measurement of stated intentions in order to
14 predict consumer behavior using the methodology suggested in the survey in the Simonson
15 Declaration is used as a qualitative measure of intention. It cannot be utilized as a precise qualitative
16 measure because it is based on an ill-defined likelihood to buy. The concept of "likelihood to buy" as
17 used in the Simonson Declaration is actually a misnomer, because it does not measure the probability
18 that a consumer would actually buy the product. In contrast, the Boedeker Study enables the
19 calculation of precise probabilities for consumers to purchase specific products with well-defined
20 attributes based on the logit model. The Simonson Declaration states that the survey used the most
21 commonly used 5-point scale to measure intention comprised of "*Definitely will buy*", "*Probably*
22 *will buy*", "*May or may not buy*", "*Probably will not buy*", and "*Definitely will not buy*".

23 16. The use of this scale is not suitable to estimate prices at which products are actually
24 sold in the market and how those prices change when product attributes change. For example, the
25 Simonson Survey asked if respondents would buy a certain Seagate Drive with an AFR<1% for \$79.
26 Only 22.9% of participants (all of whom had previously bought a Drive) indicated that they would
27 definitely buy that Drive. However, this kind of information is of no use to a manufacturer who is
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1 attempting to price its products. It is even less useful to assess how consumer demand for this
2 product would change if certain attributes of the product change.

3 17. This scale is then applied to measure the impact of AFR on purchase intentions.
4 However, this scale violates the basic principle to ensure responses that yield meaningful,
5 quantitative results that can be analyzed statistically. The choices given have to be defined in a way
6 that they have the same meaning for each respondent and the choices have to cover the entire
7 spectrum.

8 18. In Dr. Simonson's survey only choices 1 and 5 ("definitely buy" and "definitely not
9 buy"), are precisely defined answer choices under the assumption that each respondent will interpret
10 "definitely buy" as "yes" and "definitely not buy" as "no." The other three choices ("probably buy",
11 "probably not buy", and "may or may not buy") express varying degrees of uncertainty about the
12 decision, which may be interpreted differently by each respondent. Based on the wording of choices
13 2 through 4, the likelihood-of-buying up may be anywhere from 1% to 99%, or they may just be
14 discrete data points (*e.g.*, 50% for "may or may not buy"). There is no way of knowing how each of
15 the respondents interpreted the quantitative aspect of these choices.

16 19. The actual questionnaire used in the Simonson Survey – including the instructions to
17 the programmer – did not contain any further information about the exact definition of choices 2
18 through 4. For example, one respondent might choose choice 2 thinking that it corresponds to a 75%
19 likelihood that he/she will purchase the drive, whereas another respondent chooses choice 2 thinking
20 that it corresponds to a 55% likelihood. There is no consistent interpretation for choices 2 through 4.
21 Therefore, the answers with those choices are unreliable, and they should not be commingled with
22 choices 1 and 5 when reporting the results.

23 20. In addition, any "likelihood of buying" that is not 100% would result in a non-
24 purchase in the context of a real transaction. Consider, a consumer who has a 75% likelihood of
25 buying who is visiting a store to buy a Seagate drive at issue in this litigation. The likelihood of
26 buying of 75% is completely irrelevant in this case. In the actual purchase decision, the consumer
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28

1 either buys the drive, and thus becomes a member of the putative class or the consumer does not buy
2 the drive, and thus is irrelevant for the computation of class-wide economic damages.

3 21. An additional measurement problem in the Simonson Survey is caused by the fact that
4 the product description given to the Test Group (AFR<1%) and the Control Group (AFR<8%)
5 overlap, *i.e.*, a drive with an AFR<8% may have an AFR of 1% or an AFR that is smaller than 1%.
6 The Simonson Survey neither contained any information about this nor did it give any instructions to
7 the respondents how to interpret “AFR<1%” and “AFR<8%”. Based on the information in the
8 Simonson Declaration, it is impossible to ascertain what the responses to the “likelihood of buying”
9 questions actually measure.

10 **B. Opinion 2 – The survey presented in the Simonson Declaration is flawed and a**
11 **statistical analysis of the data derived from the survey supports the findings from the**
Boedeker Study.

12 22. The Simonson Survey analysis suffers from a number of flaws which renders the
13 opinions and conclusions in the Simonson Declaration irrelevant and unreliable.

14 23. The respondents of the Simonson Survey respondents were only presented with one
15 product and then asked to indicate the degree to which they would purchase the product shown. His
16 results purport to show that consumers do not value a lower AFR. His conclusion is false because
17 consumers have no frame of reference to compare the product spec sheet to. In the real world,
18 consumers have a variety of options available to choose from and to compare to. Consumers do not
19 make decisions on whether they are interested in a product in isolation. This was how Simonson’s
20 survey was designed and as a result, his conclusions are invalid.

21 24. Without a frame of reference or any other product to compare to, a consumer would
22 not know the difference between a 1% AFR and an 8% AFR. This is indicated by Dr. Simonson’s
23 results where 22.9% of respondents would definitely buy the product with an AFR of less than 1%
24 and 24.1% of respondents would definitely buy the product with an AFR of less than 8%. Without a
25 frame of reference, consumers are misled and are unable to make an informed choice. No rational
26 consumer would be more likely to purchase a product with a higher failure rate.

25. Dr. Simonson claims that “those who considered the higher AFR were not less (or more) likely to buy the product... their main focus was on other attributes such as capacity, ease of use, size and brand.” The Simonson Declaration makes this determination by analyzing the open-ended responses from the Simonson Survey. These open-ended responses are designed in such a way that they will only elicit “what comes to mind quickly” associations from a respondent. This effectively guarantees AFR to not be mentioned. AFR is not a top of mind association, nor is it a metric that consumers are acutely aware of. What consumers and respondents are aware of however, is a product’s reliability, durability, and safe storage capabilities. Consumers purchase HDs so that they can safely and reliably back up their data and have confidence that when they need their files or data, they can retrieve it without any issue. Therefore, valuing a low percentage AFR is implied when respondents cite these characteristics.

26. The Simonson Survey shows that respondents do in fact value a low percentage AFR. Reliability is mentioned by 13 of the 75 respondents who answered the open ended questions or 17% of respondents. Using the HD as a backup is mentioned by 29 out of 75 respondents or 39% of the time. Secure is mentioned by 6 out of 75 respondents or 8% of the time and safe is mentioned by 4 of the respondents or 5% of the time. One respondent even mentioned "low-risk failure". In total 52 of 75 respondents or 69% of respondents imply that they use a HD because it is a reliable way to back up their data. Based on these responses it is obvious that consumers value a low AFR.

Table 1: Number of Respondents Who Mentioned the Attribute

	Test Group < 1% AFR	Control Group < 8% AFR	Total
260 - Price / Affordable	9	6	15
265 - Price / Affordable	5	5	10
Total	14	11	25
280 - Price / Affordable	7	4	11
285 - Price / Affordable	4	4	8
Total	11	8	19
270 - Storage / Backup	29	30	59
275 - Storage / Backup	5	6	11
Total	34	36	70

27. Table 1 above¹ displays the number of respondents who mentioned price and affordability as a reason to purchase the HD and what characteristics they consider the most when deciding on a HD to buy; and the number of respondents who mention storage and back up as the main uses of their HD. 14 respondents from the Test Group and 11 respondents from the Control Group indicated that the reason to either purchase or not purchase the HD was due to price or affordability. 11 respondents from the Test Group and 8 respondents from the Control Group indicated that price was one of the most important features when deciding which HD to buy. In total, price and affordability were mentioned by 44 respondents. When prompted to state the main uses of the HD, 34 respondents from the Test Group and 36 respondents from the Control Group indicated the main use of their HD was for storage and backup.

28. The Simonson Survey completely ignores price by simply offering one HD at \$79. Based on this failure, no statements about purchase behavior and likelihood of buying can be made. The importance of price to consumers is displayed in the following table. Price and affordability statistics were generated using the search terms “price” and “afford”. Storage and backup statistics were generated using the search terms “stor” and “back”.

Table 2: Total Mentions of Each Attribute

	Test Group < 1% AFR	Control Group < 8% AFR	Total
Price	22	18	40
Affordability	3	1	4
Price & Affordability	25	19	44
Backup	10	19	29
Storage	41	34	75
Backup & Storage	51	53	104
Secure	3	3	6
Safe	3	1	4
Reliable	7	6	13
Secure, Safe & Reliable	13	10	23
Brand	11	11	22

¹ This table was generated by using partial matching on the open-ended responses to capture all permutations of the conjugations, spellings, and misspellings of the search term. I created a formula to count the number of instances that price and affordability were mentioned when respondents were asked to determine why they were or were not likely to purchase the product and what the most important feature was when deciding which HD to buy.

29. Table 2 above shows the number of mentions by attribute for all open-ended questions. The search terms used for partial matching were: “price”, “afford”, “back”, “stor”, “secur”, “safe”, “reliab”, and “brand”. 51 respondents from The Test Group and 53 respondents from The Control Group mention backup and storage for the open response questions. 13 respondents from The Test Group and 10 respondents from The Control Group indicate they want a HD that is secure, safe, and reliable. Price and affordability is mentioned 25 times by The Test Group respondents and 19 times for The Control Group respondents. Brand is mentioned 11 times by both Groups.

30. This table only represents top of mind associations with HDs in general. Open-ended questions in nature will garner what an individual immediately thinks of about a certain topic or product. What these open-ended questions fail to measure is the actual degree to which a consumer values a specific product attribute.

C. Opinion 3 – The Simonson Survey does not survey the relevant population of purchasers of Seagate drives.

31. The Simonson Survey does not adequately capture the relevant population for this matter. Table 6 in Exhibit F in the support materials to the Simonson Declaration indicates that the survey includes observations for only 94 Seagate purchasers in the Test Group (AFR<1%). This corresponds to 43.1% of all respondents in the Test Group. There were 92 Seagate purchasers in the Control Group (AFR<8%) which corresponds to 43.4% of all respondents in the Control Group.

32. Table 7 in Exhibit F in the support materials to the Simonson Declaration indicates that the survey includes observations for only 42 respondents who bought a 3TB drive in the Test Group (AFR<1%) and 30 respondents in the Control Group (AFR<8%) who bought a 3TB drive in the Control Group (AFR<8%). Applying the proportions of Seagate drive purchasers from Paragraph 20 to these figures, it is likely that the sample size of Seagate purchasers of the relevant 3TB drives is only 19 in the Test Group (43.1% of 42 rounded up to the next highest integer) and only 14 in the Control Group (43.4% of 30 rounded up to the next highest integer).

D. Opinion 4 – The Simonson Survey mirrors the Boedeker Survey in large parts but fails to generate a sufficient number of data points to draw any reliable conclusions.

33. The Simonson Survey is similar to the survey part of the Boedeker Study in many ways, and as a result, many of the criticisms that Simonson has of the Boedeker survey, is also applicable to his own.

34. Both surveys employ similar methods of questioning to extract insights from respondents. The Simonson Survey does so in an open-ended fashion, while the Boedeker Study extracts insights via stated preferences.

35. The main difference between the two surveys is Simonson uses open-ended questions to determine what respondents value in a product, while the Boedeker Study provides choice based conjoint menus to determine what respondents value. For example, the Boedeker survey shows the respondent a product with varying levels of attributes and asks the respondent “which of these options would you to purchase” at varying levels of price points, while the Simonson survey presents product spec sheets and asks the respondent to respond with the degree to which they would be likely or unlikely to purchase the product.

36. The Simonson Survey proceeds to ask additional questions such as “in general, what features, or characteristics of HDs do you consider most important when deciding which HD to buy?” and “any other HD features or characteristics that you consider important when deciding which HD to buy?”. Both of these questions are contained within the Boedeker Study as well. The conjoint analysis in the Boedeker Study reveals which characteristics or features a respondent values when deciding which HD to purchase. By selecting certain options, it is possible to isolate and extract the attributes and elements that a particular respondent values and the price at which they value it. For example, a respondent might always elect for a HD with a low AFR up until a certain price point. This indicates the respondent considers AFR an important characteristic when deciding on a HD to buy and that he or she would be willing to spend more for a low AFR.

37. Besides these similarities, the Simonson Survey suffers from a series of flaws that he critiques in his review of the Boedeker survey. The Simonson Survey omits key attributes, suffers

1 from top of mind associations which are incapable of quantifying consumer demand, and
2 respondents were not provided with any other options when considering the product spec sheets.

3 38. In addition, the Simonson Survey fails to incorporate product prices into his analysis.
4 Price is one of the most, if not the most important factor in any purchase decision. Forty respondents
5 from Simonson's survey indicate that price is one of the most important factors in deciding whether
6 or not to purchase an HD. By failing to include price as a factor in his survey and holding it as a
7 constant, Simonson is unable to quantify the value that consumers associate with any of the products'
8 features.

9 39. The open-ended questions used by Simonson suffer from the flaw that they only
10 measure what comes to mind first without any measure of quantifying the importance of these
11 factors with respect to price. This kind of questioning does not provide any insight to determine what
12 features of a product a consumer actually values. The open-ended questions in the Simonson Survey
13 do nothing except extract what a consumer immediately thinks of about an HD which may be
14 completely unrelated to consumer preferences and choices.

15 40. Respondents of the Simonson Survey were only provided with one product spec sheet
16 and were told to make a decision based off the one spec sheet. Respondents were not provided with
17 any other option-differentiating information and therefore were unable to make an informed decision
18 on whether or not the product shown was actually something they would be interested in purchasing
19 or not.

20 **E. Opinion 5 – Due to a fundamental lack of understanding Choice Based Conjoint**
21 **analysis, the Simonson Declaration misrepresents the empirical study in the Boedeker**
22 **Declaration.**

23 41. Conjoint Analysis is an approach exploring consumers' preferences over multiple sets
24 of choices, which produces rich data sets and numerous data points from which to calculate the value
25 of the feature of interest. Conjoint Analysis is conducted in a survey setting where demographic,
26 socio-economic, and general decision-making processes and preference information about the
27 product in question will be obtained and integrated into the estimation process.

1 42. Conjoint Analysis is commonly used in market research and is discussed in depth in
2 the market research literature.² Over 14,000 commercial applications of Conjoint Analysis are
3 estimated to take place each year.³ General Motors has been employing Conjoint Analysis for 40
4 years to evaluate consumer preference for (i) broad attributes such as fuel economy and quality, (ii)
5 more specific attributes such as satellite radio, and even (iii) entire vehicle lines, such as the Chevy
6 Avalanche.⁴

7 43. Vithala Rao's book, *Applied Conjoint Analysis*, gives numerous examples of the
8 widespread use of Conjoint Analysis including applications by large corporations and large public
9 agencies such as (i) Microsoft for pricing newly released software products, (ii) Proctor & Gamble
10 for consumer-goods pricing and new product development, (iii) Marriott Corporation for the
11 development of the Courtyard hotel brand, and (iv) T-Mobile for developing optimal cellular plans.
12 Conjoint Analysis was also integral to the development of the EZPass electronic toll collection
13 system by regional transit agencies in New York and New Jersey in the 1990s.⁵

14 44. The general concept behind Conjoint Analysis is that consumers' preferences for a
15 particular product are driven by features or descriptions of features embodied in that product.
16 Conjoint Analysis is a set of econometric and statistical techniques that have been developed to study
17 consumers' decision-making processes, determining trade-offs between products, features, and price,
18 as well as quantifying consumers' gains and/or losses of utility when choosing between different
19 alternatives. By simulating real world and/or hypothetical choices between product features and
20 prices, Conjoint Analysis is ideally suited to model the impact of different choice scenarios on a
21 consumer's utility function.

22 45. The data required for a Conjoint Analysis is collected through surveying where survey
23 participants spell out how the participants selected, are shown product profiles with different levels
24

25 ² See, for example: Rao, Vithala, *Applied Conjoint Analysis*, Springer Verlag, 2014.

26 ³ Orme, Bryan K, *Getting Started with Conjoint Analysis: Strategies for Pricing Research*, 2nd
ed., Madison: Research Publishers, 2005.

27 ⁴ Ibid.

28 ⁵ See an earlier citation to Vithala Rao's book.

1 of each attribute. For example, the price of an HDD is an attribute and \$69, \$79, \$89, etc., etc. are
2 levels of the attribute. The survey participants are consumers who currently are or recently have been
3 in the market for the product of interest. After reviewing a set of choice menus of product attributes
4 and their levels, survey participants are then asked to indicate their preferences for these profiles.
5 The product profiles include choice options for different price points for each set of features on the
6 choice menu.

7 46. After the completion of the survey, the Conjoint Analysis uses data from the survey
8 on the attribute levels of the product profiles shown, and the resulting preferences or choices of
9 respondents, to decompose the respondents' preferences for a product into the partial contribution of
10 these attribute levels ("part-worths") to overall product utility using appropriate statistical methods.
11 The statistical models utilized in my analysis are Mixed Logit Models and Hierarchical Bayesian
12 Estimation. These statistical estimation techniques quantify the part-worths for feature levels such
13 that the resulting estimated part-worths best indicate respondents' preferences or choices from the
14 survey common and accepted techniques.

15 47. The price reduction needed to compensate for the loss of a feature, or the additional
16 price customers would pay for the inclusion of a feature can then be calculated and a variety of
17 choice situations and trade-offs between choices can be modeled and their outcomes can be precisely
18 quantified. The precision and thus reliability of the resulting estimations depends on the number of
19 survey participants. Generally, the more respondents take part in the survey, the more precise the
20 resulting predictions.

21 48. By design, conjoint studies generate a large number of data points that yield useful
22 information about the preferences of consumers that ultimately guide their purchase decisions. For
23 example, each of the 2,000 participants in the Boedeker Study evaluated 12 menus with five choices
24 yielding a total of $2,000 * 12 * 5 = 72,000$ data points for the statistical analysis. These 72,000 data
25 points were then utilized in repeated sampling processes (10,000 iterations) to generate individual
26 preference models for each respondent that were then utilized in over 1,500 market simulations to
27 specify and quantify the purchase probabilities for all possible product combinations. In comparison,
28

1 the Simonson Study included a mere 430 data points derived from an unreliable, non-quantifiable
2 categorical variable with a poorly defined “likelihood of buying.”

3 49. Further, Conjoint Analysis can be used to assess the economic loss suffered by the
4 members of the proposed class. To determine class-wide economic loss I have proposed the use of
5 the variation of Conjoint Analysis known as Choice-Based Conjoint Analysis (“CBC”). In CBC,
6 study participants are shown sets of product profiles (called “choice sets” or “choice menus”) and are
7 asked to choose the profile that they would prefer to purchase if the choice menu offered would
8 describe the only products that were available. CBC survey methods closely mimic real-world
9 purchase processes.⁶ Conjoint Analysis allows for the prediction of the probability that a respondent
10 will choose any product profile that is described by the part-worths and can do so for any
11 competitive set of products.⁷ Based on the estimations, it is also possible to simulate how choice
12 shares would change in a market based on a change in overall price. CBC enables us to determine the
13 difference in value (measured in dollars) that customers place on a Seagate Drive with varying
14 degrees of AFRs.

15 **F. Opinion 6 – The Simonson Declaration’s criticism of focalism bias is based on a gross**
16 **misrepresentation of the Boedeker Study.**

17 50. The Simonson Declaration asserts that the decision to focus on AFR and a couple of
18 other differentiating attributes predetermined that AFR would appear to be the most influential and
19 thus be over-valued. This assertion is invalid because the criticisms he has of the conjoint analysis
20 are based on a gross misunderstanding of the design of the conjoint study itself.

21 51. The Simonson Declaration states, “although it is usually not practical to include all
22 product attributes in these hypothetical configurations, the most important attributes should be
23 explicitly included in the presented configurations for findings that could potentially inform us about
24
25

26 ⁶ Orme, Bryan K, Getting Started with Conjoint Analysis: Strategies for Pricing Research, 2nd
27 ed., Madison: Research Publishers, 2005.

28 ⁷ Allenby, Greg M & Peter E Rossi, “Hierarchical Bayes Models,” in Grover, Rajiv & Marco
Vriens, eds., The Handbook of Marketing Research, Thousand Oaks: Sage Publications, Inc., 2006.

1 real consumer choices.” The Simonson Declaration agrees that it is not practical to include all
2 product attributes but should represent the most salient ones.

3 52. The Boedeker Study follows this generally accepted and recommended approach.
4 Only the gross misrepresentation of the design of the Boedeker Study enables the Simonson
5 Declaration to make this criticism. The Boedeker Study incorporated what consumers in a pre-test
6 stated to be the most important attributes. The pre-test did not simply ask “what comes to mind first”
7 questions but rather applied a ranking and scoring method to be able to quantitatively assess the
8 importance of product attributes. The most important features as indicated by the respondents, were
9 used in the actual survey.

10 53. The Simonson Declaration criticized the use of AFR as an attribute because the pre-
11 test listed “reliability” as an attribute. This criticism has no basis and is irrelevant because the
12 Seagate spec sheets that the respondents of the Simonson Survey were shown did list AFR as the
13 first attribute under the general category of “Reliability”.

14 54. The Simonson Declaration further argues that AFR was singled out because it had the
15 biggest range and as a result would have the most impact on a respondent’s decision. This is a
16 baseless argument for a few reasons. No participant of the conjoint study ever sees the entire range of
17 levels for any of the attributes in the study, and in addition, all of the options that a participant sees in
18 their particular choice menus are randomly generated from the list of all possible combinations such
19 that each individual choice in a menu and each pair of choices appear equally often.

20 55. The use of this balanced random assignment ensures that the questions are not leading
21 or biased in any sort of fashion. A 1% AFR could be accompanied by a \$29 price point or a \$149
22 price point and any permutation of the other attributes in the study. Alternatively, a 50% AFR could
23 be accompanied by a \$29 price point or a \$149 price point and any permutation of the other attributes
24 in the study.

25 56. The fact that the AFR range is from 1% – 50% is irrelevant. Respondents consider
26 each level of a particular attribute in the context of the other attributes presented to them. The
27 respondents choose the option that provides them with the most utility, whether it be connectivity, a
28

1 low failure rate, the price, or an extended warranty. All of the attributes have varying levels to
2 determine the value a respondent places on a certain attribute level.

3 57. The examples cited in the Simonson report do not refute the Boedeker Study. The
4 Simonson Declaration cites three cases which criticize the use of conjoint studies due to focusing on
5 a few features and excluding important drivers of real world decisions.

6 58. This criticism does not apply to the Boedeker Study. As mentioned above, the
7 attributes for the Boedeker Study were derived from respondents identifying the features that were
8 the most important to them when purchasing an HD. The study was conducted with participants who
9 had previously bought HDs from different brands (Seagate, Western Digital, Toshiba, Hitachi). In
10 addition, the included attributes of capacity, reliability, expected lifetime, portability, connectivity,
11 and warranty all ranked high on the respondent's list of important attributes – therefore, the assertion
12 that the attributes used in the Boedeker Study were cherry picked in order to highlight AFR over any
13 other attribute is simply wrong. Because the attributes were determined by the respondents, they
14 reflect actual consumer preferences, and therefore, they do not bias the actual survey as the
15 Simonson Declaration falsely asserts.

16 **G. Opinion 7 – The Simonson Declaration fails to apply statistical principles of significance**
17 **and confidence intervals to the survey results making a meaningful evaluation of the**
18 **results impossible. When applying proper statistical evaluation criteria, the survey**
19 **results support the results from the Boedeker Study.**

20 59. In Paragraphs 36 and 37 of the Simonson Declaration, there are two statements that
21 are used to “prove” that the results from the Simonson Survey indicate no difference in purchase
22 intent when one group of respondents were presented with a choice to buy a Seagate Drive with a 1%
23 AFR and a control group of respondents was presented with a choice to buy a Seagate Drive with an
24 8% AFR.

25 60. However, a closer look at the “proof” provided in the Simonson Declaration reveals
26 that the proof was not based on proper statistical analysis but much rather by visual inspection or
27 simple “eye-balling” of the results.

28 61. The first major flaw in the conclusions in Paragraphs 36 and 37 is the statement that
“Differences between the two groups of at least 10% are statistically significant” couldn't be further

1 from the truth. There is no one-size-fits-all percentage difference that is the threshold for statistical
 2 significance. Statistical significance depends on the sample size and the effect that is being tested.
 3 Furthermore, there are different significance levels that the Simonson Declaration simply ignores.

4 62. The following citations from the *Reference Manual on Scientific Evidence, Third*
 5 *Edition, Federal Judicial Center: Committee on the Development of the Third Edition of the*
 6 *Reference Manual on Scientific Evidence; Committee on Science, Technology, and Law Policy and*
 7 *Global Affairs* discuss the importance of statistical significance testing when evaluating survey
 8 results. They also clearly show how the above statement in the Simonson Declaration is not based on
 9 any valid scientific statistical analysis:

10 **Page 241:**

11 Significance testing. A “null hypothesis”⁸ is formulated—for example,
 12 that a parameter takes a particular value. Because of random error, an
 13 estimated value for the parameter is likely to differ from the value
 specified by the null—even if the null is right. (“Null hypothesis” is
 often shortened to “null.”)

14 How likely is it to get a difference as large as, or larger than, the one
 15 observed in the data? This chance is known as a p-value. Small p-
 16 values argue against the null hypothesis. Statistical significance is
 17 determined by reference to the p-value; significance testing (also called
 hypothesis testing) is the technique for computing p-values and
 determining statistical significance.

18 **Pages 251, 252:**

19 Is a difference statistically significant?

20 If an observed difference is in the middle of the distribution that would
 21 be expected under the null hypothesis, there is no surprise. The sample
 22 data are of the type that often would be seen when the null hypothesis
 23 is true. The difference is not significant, as statisticians say, and the
 null hypothesis cannot be rejected. On the other hand, if the sample
 difference is far from the expected value—according to the null
 hypothesis—then the sample is unusual. The difference is significant,
 and the null hypothesis is rejected. Statistical significance is

24
 25 ⁸ The “null hypothesis” is a statement about an unknown population parameter that will be tested
 26 using data from a sample such that it can be objectively assessed if that statement must be rejected
 27 given the sample data or if it cannot be rejected given the sample data. In this case, the “null
 28 hypothesis” that the Simonson Declaration failed to mention explicitly should be stated as “The
 Likelihood of buying is independent of the fact if a respondent was asked about a Drive with a 1%
 AFR or if a respondent was asked about a drive with an 8% AFR.”

1 determined by comparing p to a preset value, called the significance
2 level. The null hypothesis is rejected when p falls below this level.

3 In practice, statistical analysts typically use levels of 5% and 1%. The
4 5% level is the most common in social science, and an analyst who
5 speaks of significant results without specifying the threshold probably
6 is using this figure. An unexplained reference to highly significant
7 results probably means that p is less than 1%. These levels of 5% and
8 1% have become icons of science and the legal process. In truth,
9 however, such levels are at best useful conventions.

63. In the statistical theory of hypothesis testing, objective decision criteria are developed
7 and then applied to actual data to determine whether observed differences are due to chance.
8 Typically, a Null Hypothesis is formulated and then compared to an Alternative Hypothesis. Actual
9 data are used to then either reject or fail to reject the Null Hypothesis. There are no general, fixed
10 thresholds or rules of thumb as the Simonson Declaration incorrectly states.

64. In the following paragraphs, I will apply the concepts of statistical significance and
12 statistical testing of hypotheses to test the Null Hypothesis if the likelihood of buying is independent
13 of the fact if a respondent was asked about a Drive with a 1% AFR or if a respondent was asked
14 about a drive with an 8% AFR. To recall, based on visual inspections, the Simonson Report drew the
15 conclusion that *"As these results show, there were no significant differences in purchase intentions*
16 *between the two groups."*⁹

65. On Paragraph's 36 and 37, the Simonson Declaration displays a summary table of the
18 survey responses to the Likelihood-to-Purchase question between the group who received the 1%
19 AFR and the one who received the 8% AFR information. Based on the work papers attached to the
20 Simonson Report, I recreated the table substituting the percentages with the respective frequencies of
21 answers given in Table 1.

66. On Paragraph's 36 and 37, the Simonson Declaration displays a summary table of the
23 survey responses to the Likelihood-to-Purchase question between the group who received the 1%
24 AFR and the one who received the 8% AFR information. Based on the work papers attached to the
25

26
27
28 ⁹ Simonson Declaration, Paragraph 37.

Simonson Report, I recreated the table substituting the percentages with the respective frequencies of answers given in Table 3.

Table 3: Likelihood of Buying With AFR<1% and AFR<8%

Likelihood of Buying	AFR < 1%		AFR < 8%	
Definitely buy	50	22.9%	51	24.1%
Probably buy	101	46.3%	83	39.2%
May or may not buy	50	22.9%	61	28.8%
Probably not buy	12	5.5%	8	3.8%
Definitely not buy	5	2.3%	9	4.2%
Total respondents	218	100.0%	212	100.0%

67. In statistics the above display of data is often referred to as a contingency table. The statistical literature recommends the use of the Chi-Square Test of Independence to objectively test the hypothesis that the distribution of answer categories in the first variable (in this case, the 5 choices for the Likelihood-of-buying) is independent of the categories in the second variable (in this case, the two different values for AFR). Alternatively, the Chi-Square test is also referred to as a test of homogeneity to assess if the distribution of responses to the categories that express the likelihood-of-buying is homogeneous within the categories reflecting the different AFRs.

68. Rather than using non-scientific methods like eye-balling, the Chi-Square test analyzes survey results and objectively measures if the observed distribution of the likelihood-of-buying categories is the same when the drives are offered with a 1% AFR or an 8% AFR. To apply the Chi-square test, I used the distribution of answers within the categories for the AFR<1% Test Group and calculated the expected frequencies in each category for the AFR<8% Control Group if they displayed the same distribution as the AFR<1% Test Group.

69. In cases, where all the frequencies in the underlying data table are greater than or equal to 5, the Chi-Squared test is a reliable test for the Independence or Homogeneity Hypothesis as defined above. Since the frequencies in the table are all between 5 and 101, I applied the Chi-Square test to the data in the table from the Simonson Declaration.

70. The resulting test statistic indicates a p-value of 3.6% which indicates that the respondents' likelihood of buying differs significantly between the group who was shown a drive with an AFR<1% and the control group who was shown a drive with an AFR <8%. In summary, the

1 application of a statistical significance test proves that the conclusion of no differences in the
 2 likelihood-of-buying a drive with and AFR<1% and a drive with an AFR<8% as offered in the
 3 Simonson Declaration is scientifically incorrect.

4 71. In the following paragraphs, I show the general rule in the Simonson Declaration that
 5 a 10% difference is the threshold for statistical significance is also incorrect. In statistical terms, a
 6 percentage is referred to as a proportion (*i.e.*, the percentage of respondents who indicated that they
 7 would buy a drive with an AFR<8% is the proportion of those respondents to all respondents).

8 72. The proportion in a well-designed sample can be used to estimate the proportion in
 9 the universe. To test statistical significance of the difference of two proportions, the two sample t-test
 10 for proportion estimators can be applied.¹⁰ In general, the significance of the difference of two
 11 proportions depends on the value of the proportion (*e.g.*, for a difference of 10% it is important if I
 12 am I interested in testing a 10% proportion against a 20% proportion or if I am I interested in testing
 13 an 80% proportion against a 90% proportion) and the sample size (*e.g.*, did the survey have 50
 14 respondents or 400 respondents). Table 4 and Table 5 below test the assertion from the Simonson
 15 Declaration that differences between two groups of at least 10% are statistically significant. For this
 16 illustrative example that the assertion regarding statistical significance in the Simonson Declaration
 17 is incorrect, I chose a significance level of 5%.

18 **Table 4: Sample Size of 400, Difference of 12%**

Sample Size	400	400	400	400
Responses	40	88	320	368
Proportion	10%	22%	80%	92%
P-value	0.0025%		6.76%	
Significance	Yes		No	

22 **Table 5: Sample Size 50, Difference of 12%**

Sample Size	50	50	50	50
Responses	5	11	40	46
Proportion	10%	22%	80%	92%
P-value	13.68%		51.91%	
Significance	No		No	

27 ¹⁰ See Robert Witte and John Witte, Statistics, 9th Edition, Chapters 14 and 15, Pages 286-333,
 28 for a detailed discussion of two sample t-tests.

73. I constructed the example such that the difference in proportions is always 12% (e.g., 10% compared to 22% and 80% compared to 92%). According to the assertion in the Simonson Declaration, all differences between samples in Table 4 and Table 5 would be statistically significant. However, the application of the two-sample-t-test for proportions proves the assertion wrong. In only one of the four tests, the difference of 12% is statistically significant. In the three other examples Dr. Simonson's assertion is plain wrong because statistical significance does not only depend on the size of the difference between two values but also the number of observations and the variances of the two samples.

H. Opinion 8 – The Simonson Declaration is based on a gross misrepresentation of fundamental economic principles of supply, demand, price setting, and consumer choice.

74. The Simonson Declaration claims that the theoretical framework of my study “is completely removed from reality and offers no relevant information” and he continues arguing that the theoretical framework of my study “is based on assumptions from theoretical economics that have been refuted many years ago”.¹¹

This ‘analysis’ is based on assumptions derived from theoretical economic articles published in the 1960s (or earlier) that do not mesh with reality. No consumer researcher, manager, or market researcher that I am aware of relies on such theoretical frameworks today.¹²

75. Based on this assertion, Economics as a science is simply rejected in the Simonson Declaration. However, the statements are without foundation and contradict basic textbooks in economics. Here I discuss Paul Samuelson's pivotal textbook first published shortly after World War II, Hal Varian's Intermediate Microeconomics a standard textbook used in teaching microeconomics for many years and the recent open-source textbook CORE (for Curriculum Open-access Resources in Economics).

¹¹ Simonson Declaration, ¶ 68.

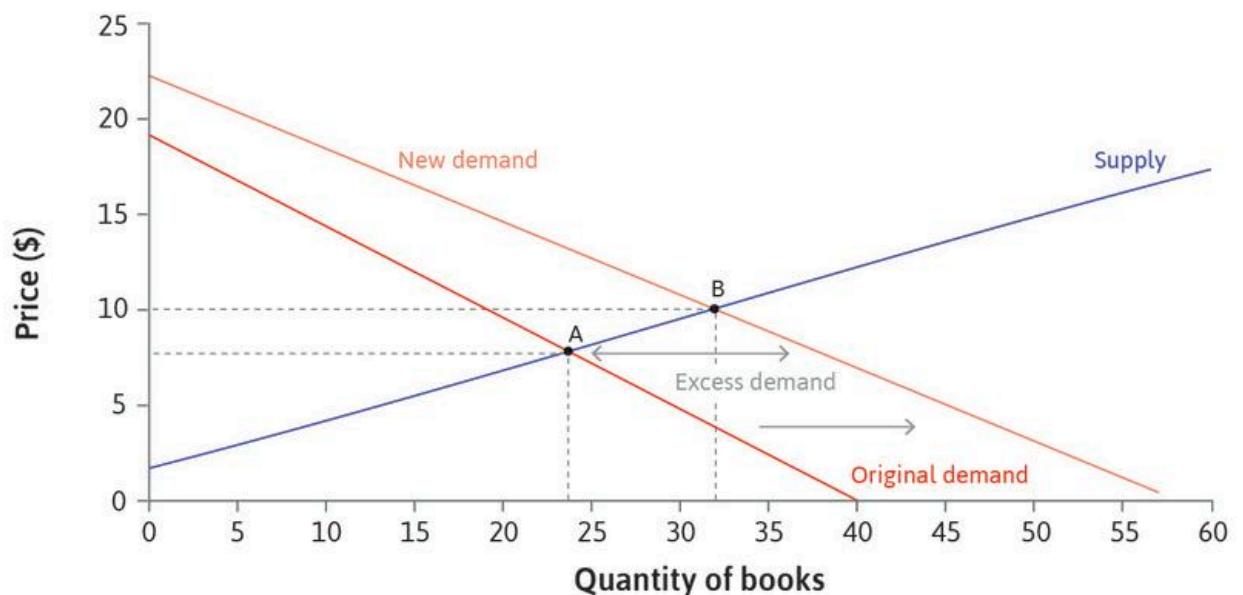
¹² Simonson Declaration, ¶ 69.

76. Paul Samuelson discusses “reasons for the law of downward-sloping demand” on page 61 in the tenth edition his textbook “Economics” that was first published in 1948.¹³ On page 65 he discusses how a shift in demand or supply affect equilibrium prices.

77. Hal Varian discusses taxation with linear demand and supply. The graph in his textbook¹⁴ looks very similar to Figure 1 to 7 in my Declaration.

78. The CORE textbook published in 2017 and continuously updated shows algebraically and graphically how shifts in demand and supply affect market equilibrium.¹⁵ The associated graph from the textbook (Figure 1) looks very similar to the graphs that I present in my section on the theoretical framework of my analysis.

Figure 1: Shift in Demand Due to a Demand Shock as Depicted in CORE Textbook



Source: <http://www.core-econ.org/the-economy/book/images/web/figure-08-11-d.jpg>

79. The Boedeker Declaration explains in detail how the above theoretical framework is applied to derive an economic loss model which is then empirically tested in the Boedeker analysis. For example, does the number of purchasers increase when the price decreases resulting in a

¹³ Paul Samuelson, Economics, 10th Edition, McGraw-Hill Book Company, New York, 1976.

¹⁴ Hal Varian, Intermediate Microeconomics, 8th Edition, 2010, Figure 16.3 on Page 301.

¹⁵ <http://www.core-econ.org/the-economy/book/text/leibniz-08-06-01.html>

1 downward sloping demand curve as assumed in my theoretical analysis? All economic textbooks I
2 am aware of, including the three textbooks cited above, make that general assumption. Some
3 standard textbooks and academic articles discuss under what circumstances the number of purchasers
4 might decrease when the price decreases, resulting in an upward sloping demand curve. However,
5 this does not mean that the general assumption on downward sloping demand curves has been
6 refuted as the Simonson Declaration claims. Moreover, the demand curves I constructed and discuss
7 in the Boedeker Declaration are based on actual data from the market simulations. These demand
8 curves clearly demonstrate that consumer demand goes down when the AFR goes up. None of the
9 demand curves displayed the characteristics that the Simonson Declaration states.

10 80. Based on economic theory we can also assume that all else equal a product with less
11 favored features, for example an average AFR of 8% rather than 1%, will lead to a downward shift of
12 the demand curve. However, it can't be stressed enough that I don't take for granted the theoretical
13 framework and the assumptions on downward sloping demand curves and a shift of the demand
14 curve when less favorable product attributes are disclosed at the point of sale. Figure 22 in my report
15 is not based on assumptions but is the result of an empirical analysis. The empirical analysis
16 resulting in the figure confirms that the demand curve for Seagate hard-drives is downward sloping
17 and that a less favorable AFR disclosed at the point of sale leads to a downward shift of the demand
18 curve.

19 81. While the Simonson Declaration claims without providing any reference that the
20 theoretic framework used in my report has been refuted, the results of the empirical analysis actually
21 presented in the Boedeker Declaration empirically confirms the theoretic economic framework.

22 V. SUMMARY AND CONCLUSIONS

23 82. Based on a thorough review and analysis of the Simonson Declaration and its
24 supporting work papers, I have formed the following opinions:

25 **Opinion 1:** The Simonson Survey is irrelevant to the determination of consumer preferences,
26 consumer demand, and economic losses.

Opinion 2: The survey presented in the Simonson Declaration is flawed and a statistical analysis of the data derived from the survey supports the findings from the Boedeker Study.

Opinion 3: The Simonson Survey does not survey the relevant population of purchasers of Seagate drives.

Opinion 4: The Simonson Survey mirrors the Boedeker Survey in large parts but fails to generate a sufficient number of data points to draw any reliable conclusions.

Opinion 5: Due to a fundamental lack of understanding Choice Based Conjoint analysis, the Simonson Declaration misrepresents the empirical study in the Boedeker Declaration.

Opinion 6: The concept of “Likelihood of Buying” in the Simonson Study is based on a misnomer and the concept itself is insufficient to provide any insights into economic losses to the members of the putative class.

Opinion 7: The Simonson Declaration fails to apply statistical principles of significance and confidence intervals to its own survey results.

Opinion 8: The Simonson Declaration is based on a gross misrepresentation of fundamental economic principles of supply, demand, price setting, and consumer choice.

83. The conclusions about the economic loss model presented in the Boedeker Declaration that have been brought forward in the Simonson Declaration are based on either gross misrepresentations and gross misunderstandings of the economic loss model in the Boedeker Declaration, or the failure to apply statistics or the incorrect application of statistical principles to the data from the survey discussed in the Simonson Declaration.

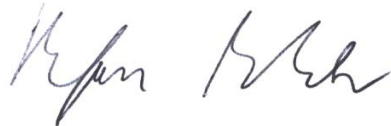
84. In fact, the Simonson Declaration neither attempts to address the question of economic loss to the members of the putative class nor does it rebut the economic theory and the econometric and statistical methodology presented in the Boedeker Declaration.

Conclusion 1: The concept of “Likelihood of Buying” in the Simonson Study is based on a misnomer and the concept itself is insufficient to provide any insights into economic losses to the members of the putative class.

1 **Conclusion 2:** The survey results in the Simonson Declaration do not support the conclusion that
2 consumers are equally likely to buy a Seagate HD with an AFR <8% and one with
3 an AFR<1%.

4 **Conclusion 3:** None of the analyses performed, opinions formulated, and conclusions drawn in the
5 Simonson Declaration have an impact on my opinions and conclusions regarding
6 economic losses suffered by the class as expressed in the Boedeker Declaration.

7 85. I declare under penalty of perjury under the laws of the United States that the
8 foregoing is true and correct. Executed this 16th day of February, 2018, at Los Angeles, CA.

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12 _____
13 Stefan Boedeker
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